COMMUNITY RISK ASSESSMENT: A SMOKE DETECTOR PROGRAM IN THE CITY OF EAST PALO ALTO

LEADING COMMUNITY RISK REDUCTION

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Appendices B through D Not Included. Please visit the Learning Resource Center on the Web at http://www.lrc.dhs.gov/ to learn how to obtain this report in its entirety through Interlibrary Loan.

Abstract

In 2002-2003, the Menlo Park Fire Protection District personnel, while surveying residences in the City of East Palo Alto for unapproved security/ burglar bars, noted that 90 percent of residences also did not have smoke detectors. The problem was in seeking to address a risk, the Fire District did not develop nor did they understand the process of risk assessment. The purpose of this research was to evaluate the Menlo Park Fire District's program for the distribution and installation of smoke detectors within the City of East Palo Alto in the context of a risk assessment/management process. Evaluative research was used to answer the following questions:

1. In the context of the East Palo Alto smoke detector program, what aspects and understanding of risk assessment/management were identified?
2. Did the Menlo Park Fire Protection District utilize an evaluation process consistent with identified risk assessment/management practices in its' smoke detector installation program?
3. What were the perceptions of the people of East Palo Alto with the smoke detector installation program?
4. What are the perceptions of Menlo Park Fire Protection District employees involved with the program?

The procedures involved a physical survey of residences in East Palo Alto to determine the number of homes that did not have smoke detectors. Additional surveys were incorporated to identify what the residents of East Palo Alto thought about the program, a survey of Fire District employees to determine their views on the program, and a survey of surrounding fire service agencies to identify what types of programs they

had in place. An extensive literature review was also conducted to define the concept of risk assessment, to identify the benefits of risk assessment in conducting a smoke detector installation process, and to identify practices in evaluating a risk assessment process.

The results of the research showed that the Menlo Park Fire Protection District had not conducted a risk assessment process as defined and demonstrated in the research. Program practices demonstrated a reactionary form of process as compared to a defined and developed risk assessment process.

Recommendations include a review of the current smoke detector installation program with focus on implementing a risk assessment process to define, develop, implement, and evaluate past, current, and future procedures in program management and resource allocation.

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Introduction

In January of 2003, the Menlo Park Fire Protection District began a program in the City of East Palo Alto to provide and install smoke detectors to all residents. The need to do this was identified during a physical survey of residences in East Palo Alto for unapproved security/burglar bars. It was noted that over 90 percent of homes did not have smoke detectors or had smoke detectors that did not operate. The problem was that in charging ahead with the program to provide smoke detectors, no risk assessment process was developed to adequately identify the goals and objectives, resources, or evaluation strategy to manage the program.

The purpose of this research was to evaluate the Menlo Park Fire District's program for the distribution and installation of smoke detectors within the City of East Palo Alto in the context of a risk assessment/management process. This information is to be used to evaluate the current program and to develop the process needed to complete the program in a cost effective and timely manner.

The Evaluative research method was used to answer the following research questions:

1. In the context of the East Palo Alto smoke detector program, what aspects and understanding of risk assessment/management were identified?
2. Did the Menlo Park Fire Protection District utilize an evaluation process consistent with risk assessment/management practices in its' smoke detector installation program?
3. What were the perceptions of the residents of East Palo Alto with the smoke detector installation program?

4. What are the perceptions of Menlo Park Fire Protection District employees involved with the program?

Background and Significance

In 2001-2002, the Menlo Park Fire Protection District conducted physical surveys of each residence in the City of East Palo Alto. These surveys were the result of having lost 11 people, nine of which were children, in residence fires in a five-year time frame. The City of East Palo Alto is a very diverse community of approximately 10, 000 people.

The exact population is unknown as there is estimated to be several thousand undocumented people living within the City. The City's demographics include populations of Latinos, Vietnamese, Tongan and other South Pacific peoples, Chinese, and African Americans. The City has a very high poverty and crime rate and has been classified as a "Target" City by both State and Federal agencies for crime prevention, education, and community infrastructure needs. In each of the fatality fires noted, in addition to noting unapproved security/burglar bars on the windows and exit doors, it was observed that none of the homes had smoke detectors. In surveying the residences of the people of East Palo Alto, it was noted that 90 percent of the homes did not have working smoke detectors or smoke detectors at all. This was directly opposite of what national statistics show for the presence of smoke detectors in residences. "Surveys indicate that over 90 percent of U.S. households have at least one working smoke alarm. Households that have reported fires are less likely to have working smoke alarms" (FEMA,USFA/NFDC, 2001, p.13).

Today less than 7 percent of homes do not have a smoke detector. However, 42 percent of reported fire and 59 percent of fire deaths occur in these homes. In

> addition to homes without smoke alarms, approximately 1 in every 5 homes have alarms that are not functioning. One-third of all fires in homes with alarms are in homes with non-functioning smoke alarms. (Tri-Data, FEMA/USFA, 2000, p.6).

The Menlo Park Fire Protection District, in cooperation with the City of East Palo Alto, developed a program for the removal of unapproved security/burglar bars and the installation of approved security bars based on two grant funded programs. These programs did not directly provide financing for other risk mitigation programs. In January of 2003, the Menlo Park Fire Protection District began a smoke detector installation program based on directed funding from the Fire District Board, through directed funding from the security/burglar bars grant, and through donations from private business concerns. In each of the development of the two programs no form of risk assessment or evaluation was developed. In an audit process this may leave the Fire District open to questions on the proper use of time, personnel, and resources. The audit process, a regular part of grant funding, has also identified problems in the cost accounting for time and materials. Collaborative programs with private entities often require that a risk identification and mitigation process be developed and implemented before programs may be fully funded.

This research is significant to the Menlo Park Fire Protection District from three perspectives: First, in the analysis of how the Fire District is identifying and mitigating a hazard or risk. Second, in how the Fire District develops and manages both public and private resources in the mitigation of a risk to public safety. Thirdly, the research can serve as a basis for the development of future risk assessment processes in providing community risk reduction programs and the targeting of emergency services.

This applied research is related to the National Fire Academy's (NFA), *Leading Community Risk Reduction Course,* a required course of the Executive Fire Officer Program at the National Fire Academy.

This research relates specifically to Unit 2, Community Risk Assessment, in developing the awareness and ability to identify, develop, implement, and evaluate a risk assessment process or program to meet identified risks within a community.

This research project also relates to and supports three of the United States Fire Administration's (USFA), operational objectives which are, "reduce the loss of life from fire in the age group 14 years and below, reduce the loss of life from fire in the age group 65 years old and above, and to promote within communities a comprehensive, multi-hazard risk reduction plan led by the fire service organization" (United States Fire Administration, 2002, p. III-2).

With a demonstrated loss of life in homes shown not to have smoke detectors for early warning and evacuation in the event of fire, the identification of homes needing smoke detectors and the providing of detectors is a critical aspect of the Fire District's ability to meet threats to life safety in the communities it serves. A fire district or department's ability to identify risk and the development of a risk reduction plan to mitigate or eliminate a threat to life safety is a primary reason for its existence.

Literature Review

The concept of risk assessment has been studied extensively in the private sector, but has not been a defined focus of study in the public sector. If risk assessment is to be utilized in the fire service and the public sector, it must first be defined.

> A dictionary (Webster's) defines "risk" as a noun and a verb. (Noun) The possibility of meeting danger or suffering harm or loss, or exposure to harm or loss. (Noun) A person or thing insured or representing a source of risk. (Verb) To expose to the chance of injury or loss (FEMA, 1996, p.4).

Traditionally, risk was something that people in the fire service faced without extensive analysis or thought.

We cannot manage risk if we do not understand:

1. where it is coming from, in terms of what detrimental effects might be experienced, and the mechanisms underlying these effects;
2. what we might do about it, in proactive and reactive response terms;
3. what might go wrong with our responses-that is secondary risks (Chapman, S. & Ward S., 1997, p. 55).

The ability to forecast, analyze, quantify, and mitigate risk was not within the parameters of what the fire service perceived its mission to be.

> The word "risk" derives from the early Italian *risicare* which means "to dare." In this sense, risk is a choice rather than a fate. The actions we dare to take, which depend on how free we are to make choices, are what the story of risk is all about (Bernstein, 1996, p.8).

In the Federal Emergency Management Agency (FEMA) State and Local Mitigation Planning Guidelines, risk is defined as:

> The estimated impact that a hazard would have on people, service facilities, and structure in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms

> such as high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It can also be expressed in terms of potential monetary losses associated with the intensity of the hazard (FEMA, 2002, p. 3).

The fire service has not traditionally sought to understand the concept of risk. Hazards were something to be faced and were considered part of the job.

> The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk: the notion that the future is more than a whim of the gods and that men and women are not passive before nature. Until human beings discovered a way across the boundary, the future was a mirror of the past or the murky domain of oracles and soothsayers who held a monopoly over knowledge of anticipated events (Bernstein, 1996, p.1).

In this research the process of risk assessment is explored from the perspective of the public, the City of East Palo Alto, a private grant provider, a private business contributing to a public entity directed program, and the Menlo Park Fire Protection District. In the framework of the smoke detector installation program and the many contributing entities, risk assessment/management may be defined in the following context:

> Any activity that involves the evaluation and comparison of risks and the development of approaches that change the probability or the consequences of a harmful action. Risk management comprises the entire process of identification, selection, and implementation of control measures that might alter risk (FEMA/USFA 1996, p.7).

The assessment of risk involves analysis of factors that indicate a threat to safety. In this paper risk analysis is the framework for the process of risk management under the overall concept of risk. Risk analysis:

> Is a process that identifies fire and life safety problems and the demographic characteristics of those at risk in a community. A thorough risk analysis provides insight into the worst fire and life safety problems and the people who are affected. The analysis results create the foundation for developing risk reduction and community education programs (FEMA/USFA, 2002, p. 1-1).

Risk assessment provides for a framework in which a hazard may be identified and eliminated or mitigated. "Risk assessment comprises the entire process of identification and evaluation of risks as well as the identification, selection, and implementation of control measures that might alter risk (FEMA/USFA 1996, p.7).

The National Fire Academy Course: *Executive Analysis of Fire Service Operations in Emergency Management Text,* defines risk assessment by, "dividing hazards into two components—exposure and effects. Exposures are all the hazards found in a community. Effects are what happen after the exposure manifests itself" (FEMA/USFA, 2001, p.4-14).

The literature identified that the risk and the practice of risk assessment are from a historical perspective not new concepts. They are relatively new ideas for the fire service. Whether understood from the private sector or public service, the underlying perspective is that risk is made up of processes that may be specific to each risk. What the many different definitions of risk seem to agree upon is that, "uncertainty is at the

heart of the definition of risk" (FEMA/USFA-NFA, 2003, p. 2-77) and, "to control risk means for the most part to control uncertainty" (Elms, 1998, p. 296).

The operational benefits of conducting a risk assessment process evolve around the planning process. The process, "provides valuable planning information and catalogues and organizes information" (FEMA/USFA-NFA, 2003, p. 2-8).

The ability to make decisions based on a risk assessment process, "depends on the quantity, quality, accessibility, and usability of information provided to decision makers" (FEMA/USFA-NFA, 2003, p. 2-81). This information is often defined in a qualitative or quantitative perspective. "Qualitative analysis analyzes exposures and effects using descriptive data. Quantitative analyzes data based on measurable effects from both a probability and consequences statistical perspective" (FEMA/USFA-NFA, 2003, p. 2-81).

"There is no one right way to go about conducting a risk assessment" (FEMA/USFA, 2001, p.33). This idea identifies that risk assessment evolves around variables. Five variables that affect a risk assessment and thus a community are:

- danger/destruction
- economic
- environmental
- social
- political (FEMA/USFA, 2001, p.23)

To develop the goals and objectives and create the operational plan needed to conduct a risk assessment a commonly recognized set of steps is recognized. These include:

- Identifying Risk Exposure
- Evaluating Risk Potential
- Ranking and Prioritizing Risks
- Determining and Implementing Control Actions
- Evaluating and Revising Actions and Techniques (FEMA, 1996, p.39)

Risks may be categorized by:

- the situation in which the hazard or risk is encountered
- the cause of the hazard or risk itself
- the manner in which the hazard is perceived
- the magnitude of the hazard or risk
- the geographic division of hazard or risk management
- the dollars expended to mange the hazard or risk
- the ratio of dollar damage to dollar benefit
- the way the hazard or risk is already managed (USDC, NTIS, 1982, p.10)

Important factors that should be considered in an effective risk assessment process include:

- Predicted Effect: What savings will likely result?
- Time Required: How long will it take?
- Time to Results: Long term results.
- Effort Required: How much and is it effectively applied?
- Associated Costs: How much will it cost—directly and indirectly? (FEMA, 1996, p.39).

The operational or effective implementation of a risk assessment process is based on the idea that there is a risk management plan. “A risk management plan serves as documentation that risks have been identified and evaluated and that a reasonable control plan has been implemented and followed” (NFPA 1500, 2002, p. 73).

Developing and implementing a well planned and thought out assessment process helps all involved to:

- conceptualize and understand hazards faced by the community;
- identify possible mitigation measures;
- document results of the decision making process; and
- communicate about risks with officials and the general public (FEMA, USFA, 2002, p. 4-30).

An operationally effective and beneficial risk assessment process can be more effective if the target population and the people conducting the process:

- Are aware of the problem
- Understand the problem and the factors that contribute to it:
- Believe themselves, or their loved ones, to be personally at risk
- Believe that the risk is unacceptable and serious
- Understand that solutions to the problems exist
- Believe that changes in their behavior will reduce the risk
- Believe that the benefits to change will outweigh barriers (FEMA, USFA, FA-219, 2002, p. 3-6).

In the evaluation of a risk assessment program a factor that cannot be overlooked is the dedication of resources to the implementation and monitoring of the program. Implementation and monitoring should:

1. Set performance objectives
2. Specify responsibilities
3. Allocate and control resources
4. Specify schedules and milestones
5. Monitor progress and achievements
6. Assist in the resolution of problems (Bowdin, A., Lane, M. & Martin, J. 2001, p.113).

In the implementation of a risk assessment/management program it should be remembered that these programs, conducted properly, "are dynamic in nature, and require continuous review and revision" (Kipp, J. & Loflin, L. 1996, p.17).

How an entity explains risk to the people it is trying to serve, is a question often overlooked when developing, implementing, and evaluating a risk assessment program. There is little value in implementing a risk assessment process targeting a specific risk if the people affected don't understand the long-term benefits (Aus, G., 2003, p. 27).

Among the most important factors in communicating risks to the public are:

(a) voluntary risks are accepted more readily than imposed risks; (b) risk under individual control are accepted more readily than those under government control; (c) risks that seem fair are more acceptable than those

> that seem unfair; and (d) risk information that comes from trustworthy sources is more readily believed than information from untrustworthy sources (Chess, C., Hance, B. & Sandman, P., 1989, p. 113).

In evaluating success or failure of a risk assessment process or program, a key element, "is to determine whether stated goals and objectives were realistic and measurable. In the same sense risk assessment/management must be flexible and dynamic in its ability to change as attitudes, directives, and priorities are identified" (Aus, G., 2003, p 28).

As identified in the literature, simply defining the concept of risk assessment is not adequate in assessing perceived or identified risks. For a risk to be mitigated, a formal process which identifies how an organization will utilize both human and financial resources should be developed. This provides a basis for risk assessment processes to be evaluated from the organizational perspective as well as the effected target group perspective.

Procedures

Procedures utilized in this research involved the use of three survey instruments. The first survey was developed before the smoke detector program in the City of East Palo Alto was instituted. This survey asked twenty representative fire service agencies (50-2200 personnel) within the nine counties of the San Francisco Bay Area of California, what type, if any, smoke detector program they had developed and whether an understanding or formal risk assessment process was utilized. (See Appendix A) A focus on surveying fire service agencies within the San Francisco Bay Area was decided upon based on the type of demographics, economic similarities, and governmental

structure which the Menlo Park Fire Protection District operates within. Surveys were either sent via mail or conducted by phone with a representative of each agency's Fire Prevention Division

A second survey (See Appendix B), was developed in which residents of residences in East Palo Alto, where smoke detectors were provided and or installed, were asked to identify the effectiveness of the program and to provide their level of understanding of smoke detector use and testing requirements. This process was conducted during the time when smoke detectors were being installed in the residences. A total of 500 residences were identified in the City of East Palo Alto utilizing housing data provided by the City building department. Installation of smoke detectors and surveys were provided by firefighters from the two engine companies serving the City of East Palo Alto, volunteers from the Fire District Firefighters Association, Kiwanis service group, Menlo Atherton High School students, and the Menlo Park Retired Firefighters Association. A specific Saturday during each quarter of the year was identified to target residents of East Palo Alto. Neighborhoods of 100-200 homes were identified for each Saturday program, with advance notification of the program provided via door hangers, flyers, and media announcements. (See Appendix C)

A third survey instrument (See Appendix D), was utilized to identify Fire District's personnel perception of the effectiveness of the smoke detector program from the perspective of risk assessment. The author sought to identify how much personnel understood of the process, its value in this type of community program, and whether the concept of risk was being adequately explained to and understood by City residents in the

mitigation of hazards to life safety. Surveys involved the author interviewing 40 Fire District employees directly involved in the program.

Limitations and Assumptions

The results of this research were influenced by several factors. First, the smoke detector installation program focused on the City of East Palo Alto based on grant funding received by the Fire District and the City of East Palo Alto. Though smoke detectors were available to other communities served by the Fire District, they were on an individual residence basis and not in the context of a program. Results of the program are thus limited to the City of East Palo Alto.

The literature review for this research identified that a majority of the literature on risk assessment/management focuses on the private sector. There is to date limited information on risk assessment focusing on specific public sector case studies or focused literature. The majority of public sector risk assessment information available focuses on firefighter safety and fire suppression operations.

Terms Defined

Menlo Park Fire Protection District- A State of California legally organized Fire District providing fire and emergency medical services for the communities of Atherton, East Palo Alto, Menlo Park, and unincorporated parts of Southern San Mateo County, California.

City of East Palo Alto- A legally chartered city located within the San Francisco Bay Area (Peninsula Area) and that is part of San Mateo County, California.

Hazard- A source of potential danger or adverse conditions

Mitigate- To cause something to become less harsh or hostile, to make less severe or

painful.

Results

The author utilized three survey instruments in developing this research project. The author was interested in identifying whether surrounding fire districts or departments had or were implementing smoke detector programs, and if in doing so, they were basing these programs on a risk assessment process? The results were compared with the understanding of those Menlo Park Fire District personnel involved in the East Palo Alto Smoke Detector Program. A total of 20 departments representing the San Francisco Bay Area, were randomly selected for the survey process. The author received 20 responses based on follow up phone calls to make sure surveys had been received and to stress the importance of each agency's responses.

The First Question, asked whether the responding fire service agency had a formal smoke detector program. Five departments indicated yes, while 15 stated no.

In Question Two, respondents were asked if their program was based on a risk assessment or hazard analysis. The same five departments that indicated they had programs in place, also indicated that these programs were based on a hazard or risk assessment process.

In Question Three, respondents were asked to identify how they provided smoke detectors in lieu of a formal program. The twenty departments responding stated that they did provide smoke detectors to people who asked, though many did not provide installation services. The basis for these informal programs was

based on the following aspects: public requests: 3; reaction to fire activity/life loss: 5; part of public relations: 10; desire to follow what other agencies are doing: 2.

In Question Four, respondents were asked if any type of survey was conducted to determine public perception and or acceptance of their smoke detector program. Two departments indicated yes, while 18 stated no.

In Question Five, respondents were asked if agencies had interviewed their respective personnel to identify their understanding of their program. Two departments indicated yes, with eighteen stating no.

Relating these results to Research Questions One and Four, provided the author with information as to the lack of understanding in defining and implementing a risk assessment or hazard analysis process that fire service agencies have in the Bay Area. Results indicate that smoke detectors are being provided, but this appears to be based on more of a public relations or service basis without a formal direction or purpose. These results were compared with the perceptions of Menlo Park Fire District personnel who have volunteered to be part of the East Palo Alto Program.

Forty surveys were distributed to members of the Fire District who volunteered to be part of the smoke detector program. The author focused on these participants with the intent of addressing research questions One, Two, and Four. All of the Fire District's personnel were not surveyed. It was identified in informal conversations with operations personnel that there was little

understanding of risk assessment or the East Palo Alto Smoke Detector Program outside of the 40 in-house participants.

The First Question, asked respondents to identify what they believed the justification for the smoke detector program was.

a. (34) District's response to multiple residential fires
b. (0) A formal risk assessment or hazard analysis
c. (6) Part of District's public relations/public education program
d. (0) Directive from District's Board of Directors
e. (0) Other

In Question Two, respondents were asked to identify if they had an understanding of the risk assessment process. Thirty-five people indicated that they did not. Five indicated they did.

In Question Three, respondents were asked if a formal risk assessment process would benefit the smoke detector program. With all but five respondents indicating in Question Two, that they did not understand the concept of risk assessment, the results were the same as in Question Two.

Question Four, asked respondents why they did or did not feel a risk assessment process would benefit the smoke detector program. Written answers were solicited.

Why it would not benefit: most commonly stated reason was unfamiliarity with the concept and how it would be designed and implemented

Why it would: Provide for better justification of purpose;

Better focus of resources;

More defined goals and objectives;

Better acceptance by Firefighters Association with a formal plan

showing specific responsibilities

The results of this survey revealed that in respect to research Questions One, Two, and Four, Fire District personnel, and in specific those members working within the smoke detector program, did not have an understanding of risk assessment. Without understanding the concept, a formal assessment process or form of evaluation other than a basic survey of perceptions of residents has not been realized. Success of the program within the Fire District although favorable from the participants' perspective, is limited also to perception.

The third survey instrument used involved surveying residents while smoke detectors were being installed in their residences. Questions were asked in both English and Spanish and were conducted primarily by community service volunteers. A total of 500 owners or people leasing a residence were surveyed of which 100 choose not to participate.

Question One asked respondents if the program provided information that they were not aware of in respect to smoke detectors. A total of 280 people answered this question with the three most prevalent answers centering around how detectors worked, the frequency and importance of testing, and the importance of correct placement.

Results of Questions Two through Four were based on the identified finding that 90 percent of the residences originally surveyed did not have smoke detectors. Total responses for Question Two through Four represent participant responses for each question.

In Question Two, respondents with existing smoke detectors were asked when they last tested their smoke alarm.

(0) Never

(0) 0-3 months

(10) 3-6 months

(20) 6-12 months

(10) 1 year or more

In Question Three, respondents with existing smoke detectors were asked when they last changed their smoke alarm battery.

(0) Never

(0) 0-6 months

(7) 6- 12 months

(10) 1 year or more

(23) When it starts chirping

In Question Four, respondents were asked where they had smoke detectors in their homes.

(0) Kitchen

(4) Living Room

(0) Garage

(24) Hallways

(12) Bedrooms

(0) Bathroom

(0) Other

In Question Five, respondents were asked if they felt that this program was beneficial to them. In this question surveyors were able to solicit responses from the 400 residents who chose to be surveyed. A total of 380 people stated yes, with 20 stating no.

In Question Six, respondents were asked to state how the program could be improved. The most common responses were: Provide more multi-lingual information, utilize churches serving ethnic populations to introduce and reinforce the importance of such a program, and a recommendation that Fire District personnel not wear uniforms with badges, but polo or T- Shirts with District logo during installation days so as not to cause concern among residents.

In analyzing the survey results in respect to Research Question 3, it may be concluded that residents of East Palo Alto though viewing the smoke detector program in a positive light, are depending on agencies like the Fire District to provide and reinforce an understanding of smoke detector use. A very diverse population, language barriers, and mistrust of government entities, remains a challenge to effective program implementation.

Discussion

The results of the research indicate that risk assessment is historically not a new concept, but its importance and a definitive understanding have yet to be realized in the fire service. Bernstein (1996), states that the word risk derives from the early Italian *risicare.* Results of the surveys conducted show that the Fire Service within the Bay Area and the Menlo Park Fire Protection District did not have a clear understanding of the concept of risk assessment. Bernstein (1996), identifies that the ability to identify future challenges to safety is dependent upon an understanding of the past. “The

revolutionary idea that defines the boundary between modern times and the past is the mastery of risk" (p.1).

In the context of the smoke detector program Fire District personnel have sought to address a threat to life safety from fire. This process has been primarily from a reactionary stance, based on the number of lives lost in residential fires within the City of East Palo Alto. Chapman and Ward (1997), identify that risk cannot be managed if a clear understanding of the effects, proactive vs. reactive response isn't understood, and the secondary effects of what might go wrong with a mismanaged response aren't identified.

The fire service, and in specific the Menlo Park Fire Protection District, have not identified the resources in which to conduct a formal risk assessment. The research indicated that information in defining, implementing, and evaluating risk assessment and hazard analysis has been developed from the Federal Emergency Management Agency (1996, 2002, 2001) with specific information in the development of risk assessment into two components, "exposure and effects" (FEMA/USFA, 2001, p.4-14).

The literature identified a central theme that is, "uncertainty is at the heart of the definition of risk" (FEMA/USFA-NFA, 2003, p.2-77), and "to control risk means for the most part to control uncertainty" (Elms, 1998, p. 216). These statements though basic, point out what the smoke detector programs of the departments surveyed as well as citizens surveyed have failed to recognize, that being able to control or mitigate a hazard (uncertainty), it must first be clearly identified and a process then developed to mitigate or remove the hazard realized. To develop anything less, is to continue a reactionary process or program.

The data gathered produced an insight into the lack of process or program evaluation. Five factors of danger/destruction, economic, environmental, social, and political (FEMA/USFA, 2001), were identified as factors that must be evaluated within a community as part of an effective risk assessment process. The use of surveys asking residents and participating Fire District personnel their perceptions and understandings, should be one part of an effective risk assessment evaluation process. Following a list of steps in the development of an operational plan for conducting a risk assessment (FEMA, 1996), would have provided a basic framework from which to create a more cohesive program. Specifically whether time, money, and human resources were used efficiently or inefficiently in this program was not identified. This is a crucial aspect of justifying an organization's actions within a grant program audit.

The importance of categorizing known risks that are identified also becomes part of an effective risk assessment evaluation (USDC, NTIS, 1982). These become part of the evaluation process in the predicted effect, time required, time to results, effort required, and associated costs (FEMA, 1996), in completing and evaluating a risk assessment and mitigation process.

Clear explanations to the citizens effected and to those participating in the smoke detector program of what the goals and objectives were, and then verifying their acceptance of the program was not done. A targeted population must understand why it is being identified. In this case, providing smoke detectors without education or a follow-up process creates a limited understanding and acceptance. (FEMA, USFA, FA-219, 2002).

The citizens of East Palo Alto face daily economic and crime related challenges. Their concept of risk and its severity to them is based on a number of threats, all of which they perceive from the ability to control or from which their lives are influenced. What citizens view as voluntary risks as compared to uncontrollable risks (Chess, C., Hance, B. & Sandman, P.1989), is different from what Fire District personnel and governing entities understand a risk to be. Survey results of smoke detector usage, testing, and replacement indicated that the concept of uncertainty, a key aspect of risk assessment, is not a tangible concern for most residents. The challenges of poverty and crime are clearly identified as real and threatening.

Based on the review of survey responses from both fire departments surveyed in the Bay Area and from information received from Menlo Park Fire District personnel, it is evident that no formal evaluation process exists in local smoke detector installation programs. When both human and financial resources are dedicated, a formal evaluation process based on clearly stated program goals and objectives is needed. (Bowdin, A, Lane, M. and Martin, J., 1989), identified the aspects of implementation and monitoring of a risk assessment process critical to success.

Key to any risk assessment process which is conducted properly, is the idea that such processes, “are dynamic in nature, and require continuous review and revision” (Kipp, J. &Loflin, L. 1996, p.17).

The literature review identified a wealth and diversity of information on risk assessment. Survey results indicate a lack of understanding or focus on the importance of risk assessment from a smoke detector implementation program perspective. The

literature and program processes exist to develop, implement, and evaluate an effective risk assessment process.

Recommendations

The Menlo Park Fire Protection District and the majority of fire departments surveyed within the San Francisco Bay Area, have in the design and implementation of their local smoke detector installation programs, not developed a formal risk assessment process. The literature review identified that the formal development, implementation, and evaluation framework exists to meet the challenges of developing a risk assessment process for an effective smoke detector program. In seeking to eliminate the potential of life loss from fire by providing smoke detectors to residents, the Menlo Park Fire Protection District is reacting to a known threat to life safety. It has not however, provided any type of risk assessment necessary to identify why people have not provided smoke detectors in their homes or are not maintaining them. Consequently, the life safety hazard may be reduced for a period of time, but it is not eliminating or mitigating the problem.

Research findings identified that risk assessment is not a static process and that as variables are identified, the process must be adaptable. Current smoke detector programs within the Bay Area are designed to provide detectors with little education or tracking of potential problems. In the case of the East Palo Alto program, grant money is being used to support the Fire District's efforts. This type of funding requires a detailed accounting of resources utilized. A formal risk assessment process identifies problems, program implementation requirements based on the need; implements a process in which goals

and objectives are met; is adaptable to variables as they arise; and implements an evaluation process which identifies future needs so as to eliminate a life safety hazard.

Data from the surveys conducted indicates that the majority of the fire service in the San Francisco Bay Area and specifically in the Menlo Park area, does not understand the concept of risk assessment nor do they have a clear perception of its importance to the fire service in relation to community life safety challenges. A number of recommendations may be identified:

- Develop a formal educational process within the Fire District in which the concept of risk assessment is taught with emphasis on process and procedures for the identification and mitigation or elimination of life safety hazards.
- Identify those fire district or departments (Nationally), who have developed risk assessment processes for programs like the one in East Palo Alto and learn from their success as well as challenges encountered.
- Fire District personnel involved in such community programs must have an in depth understanding of risk assessment with the ability to utilize concepts from both a public and private sector perspective.
- Identify the population the Fire District is trying to reach. In the case of East Palo Alto, a very diverse and economically challenged population will not readily accept a government entity trying to direct their lives.
- A risk assessment process must identify attitudes and beliefs in relation to a life safety challenge, and then change these attitudes and beliefs through education, example, and related ethnic service group support.

The citizens of East Palo Alto have demonstrated an acceptance of the smoke detector installation program, welcoming both volunteers and Fire District personnel into their homes. The Fire District has reacted to a demonstrated need based on lives lost in residential fires within the City of East Palo Alto. In seeking to do better the Fire District must ask if the threat they are addressing will be eliminated upon completion of the program. An understanding of the dynamics of a risk assessment process in combination with a formal plan for implementation and evaluation is critical to identify the true challenges and solutions to meet threats to life safety.

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Appendix A

Fire Service Agency Smoke Detector Program Survey

The Menlo Park Fire Protection District is developing a smoke detector program for the citizens of the City of East Palo Alto. The following questions ask you to identify whether you have a smoke detector program and whether such a program is based on a formal risk analysis process. Your help in completing this survey is greatly appreciated. If you have questions please call Geoffrey Aus at (650) 688-8425.

1. Do you have a formal smoke detector installation program within your jurisdiction? Yes No
2. Is your program based on a risk assessment or hazard analysis?
   Yes No
3. If not, what is your program based on?
   a. public requests
   b. reaction to fire activity/ life loss
   c. part of public relations
   d. desire to follow what other agencies are doing
   e. other _____
4. Do you conduct any type of survey to determine public perception and or acceptance of your smoke detector program? Yes No
5. Have you conducted surveys of your fire service agency personnel to identify their understanding and or acceptance of the program? Yes No

Thank you.

Appendix A (Responses)

Survey of Menlo Park Fire Protection District Personnel on the East Palo Alto Smoke Detector Program

The Menlo Park Fire Protection District is developing a smoke detector program for the citizens of the City of East Palo Alto. The following questions ask you to identify whether you have a smoke detector program and whether such a program is based on a formal risk analysis process. Your help in completing this survey is greatly appreciated. If you have questions please call Geoffrey Aus at (650) 688-8425.

1. Do you have a formal smoke detector installation program within your jurisdiction? Yes **(5)** No **(15)**
2. Is your program based on a risk assessment or hazard analysis?

   Yes No **(5) Departments responded**
3. If not, what is your program based on?
   a. public requests **(3)**
   b. reaction to fire activity/ life loss **(5)**
   c. part of public relations **(10)**
   d. desire to follow what other agencies are doing **(2)**
   e. other _____
4. Do you conduct any type of survey to determine public perception and or acceptance of your smoke detector program? Yes **(2)** No **(18)**
5. Have you conducted surveys of your fire service agency personnel to identify their understanding and or acceptance of the program? Yes **(2)** No **(18)**

Thank you.

Fire Service Agencies Surveyed

Palo Alto Fire Department

Redwood City Fire Department

Novato Fire Protection District

San Rafael Fire Department

Contra Costa County Fire District

Alameda County Fire Department

San Ramon Valley Fire District

Livermore-Pleasanton Fire Department

Oakland Fire Department

Fremont Fire Department

San Francisco Fire Department

Santa Rosa Fire Department

Santa Clara Fire Department

Richmond Fire Department

Vallejo Fire Department

San Jose Fire Department

San Mateo Fire Department

Union City Fire Department

Santa Clara Fire Department

Sunnyvale Department of Public Safety